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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/047,455	01/15/2002	Edwin L. Pinc	N00400/70013 RJP/RHW	1054
23628	7590	07/07/2006	EXAMINER	
WOLF GREENFIELD & SACKS, PC FEDERAL RESERVE PLAZA 600 ATLANTIC AVENUE BOSTON, MA 02210-2206			HU, SHOUXIANG	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 07/07/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

32

Office Action Summary	Application No. 10/047,455	Applicant(s) PINER ET AL.	
	Examiner Shouxiang Hu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,12-16,19-22,30,39-43 and 45-47 is/are pending in the application.
- 4a) Of the above claim(s) 1,12-16,19-22,39-42 and 45-47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 30 and 43 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Election/Restrictions

Claims 1, 12-16, 19-22, 39-42 and 45-47 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being unreadable on the elected species.

The amended claim 1 recites the subject matters of an intrinsic gallium nitride material layer formed between the silicon substrate and the aluminum gallium nitride layer, which is only readable on the unelected species of Fig. 5, but unreadable on the elected species of Fig. 3.

Accordingly, claims 1, 12-16, 19-22, 30, 39-43 and 45-47 are pending in this application; and claims 30 and 43 remain active in this office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 30 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito (WO98/44569; also see US 6,583,442 for its English translation) in view of Bulsara (US 6,589,335).

Ito discloses a semiconductor structure (see US 6,583,442; Fig. 1, col. 3, lines 45-52, and col. 4, lines 1-10), comprising: a substrate layer (at least the bottom portion of the substrate layer similar to layer 101 in Fig. 1); a silicon germanium layer (at least the top portion layer of the substrate layer similar to layer 101 in Fig. 1); a gallium nitride material layer (similar to layer 102, 103, and/or 104); and, an intermediate layer (at least the layer 102; GaN, or a bottom portion of it).

Although Ito does not expressly disclose that the SiGe can be formed on a silicon substrate, one of ordinary skill in the art would readily recognize that a silicon substrate can be desirably and commonly used to form a SiGe layer thereon for improving the substrate's cost and/or quality, as evidenced in Bulsara (see the SiGe layer 104 on the silicon substrate 102 in Fig. 1A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Si-substrate-based SiGe layer of Bulsara into the semiconductor structure of Ito, so that a structure with improvement in substrate quality and/or cost would be obtained.

Response to Arguments

Applicant's arguments filed on May 10, 2004 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208

Art Unit: 2811

USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). And, in response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Ito discloses the claimed invention, except the recited silicon substrate. Bulsara is cited to show that one of ordinary skill in the art would readily recognize that such a silicon substrate can be desirably and commonly used to form a SiGe layer thereon for improving the substrate's cost and/or quality. Therefore, it would be well within the ordinary skill in the art to incorporate the Si-substrate-based SiGe layer of Bulsara into the semiconductor structure of Ito, so as to make a structure with improved substrate quality and/or cost.

Furthermore, Ito does not constitute any teaching away from the claimed invention, as the one of ordinary skill in the art would readily recognize that the LED structure shown in the cover page figure in Ito can naturally and readily emit light through the top transparent electrode, regardless what material the substrate is made of. Moreover, the SiGe substrate of Ito can be naturally regarded as an alloy of Si and Ge which can naturally cover an alloy composition with substantially low Ge, which will render the substrate to be substantially similar to a silicon substrate in optical properties.

Responses to applicant's other arguments have been incorporated into the Detailed Office action above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH
June 25, 2006



SHOUXIANG HU
PRIMARY EXAMINER